



GE Medical Systems
Kretz Ultrasound

User's Guide

Direction 105847

Revision 0

VOLUSON[®] 730

CE 0366

Copyright[®] 2002 by GE Medical Systems - Kretz Ultrasound



Revision History

Reason for Change

REV	DATE	REASON FOR CHANGE
Rev.0	April 30, 2002	Initial Release

List of effective Pages

PAGE NUMBER	REV #	PAGE NUMBER	REV #
Cover	0		
Revision History	0		
Contents	0		
Page 1 - 18	0		

Contents of the User's Guide

- Basic Measurements **16**
- Calculation Measurements
- OB Calculations
- GYN Calculations
- Cardio Calculations **17**
- Vascular Calculations

- Real Time 4D-Mode **12**
- 4D Cine
- Real Time 4D Biopsy **13**

- VCI (Volume Contrast Imaging) **14**
- Live 3D Mode
- Printing **15**
- Recording
- Saving
- Report

- Spectral Doppler **8**
- Real-Time Trace
- CFM-Mode
- PD-Mode **9**
- TD-Mode

- 3D Volume Mode **10**
- 3D Rotation Cine **11**
- Tool Menu

- 2D-Mode **4**
- Depth, Power, Frequency, Harmonic Imaging, TGC, Focus, OTI, Image Angle
- β -View, FFC, CRI
- Trapezoid-Mode
- Image Orientation
- Multi-format **5**
- HR-/ Pan-Zoom

- Gray Chroma Map
- Utilities- Menu **6**
- 2D Auto Cine
- Cine-Mode
- Spectral Doppler- or M-Cineloop
- M-Mode **7**

- Introduction **1**
- Electronic User Manual (EUM)

- Probe / Program Selection **2**
- Functions of the Trackball
- Freeze /Run
- Entering Patient Data
- Image Annotation
- Indicator **3**
- Pictograms
- Graphic clear

Introduction: The [chapter references](#) of this quick guide are based on the electronic user manual (EUM) which is installed in the Voluson 730.

The Electronic User Manual (EUM)

To install the electronic User Manual see *chapter 3.6.1* in the Operation Manual of the Voluson 730.



Press the [F1] key on the keyboard to invoke the electronic user manual.
The EUM-screen appears.

The electronic user manual contains 3 possibilities to facilitate the searching for desired topics:

- **Help Topic: Contents** [\(chapter 3.6.3\)](#)
- **Help Topic: Index** [\(chapter 3.6.4\)](#)
- **Help Topic: Find** [\(chapter 3.6.5\)](#)




With the [Back] key it is possible to change to the topic selected previously.

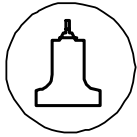


With the [Print] key it is possible to print out the selected topic on the default line printer.



Press the [ESC] key on the keyboard, or the  symbol on the Help-window to exit the electronic user manual.

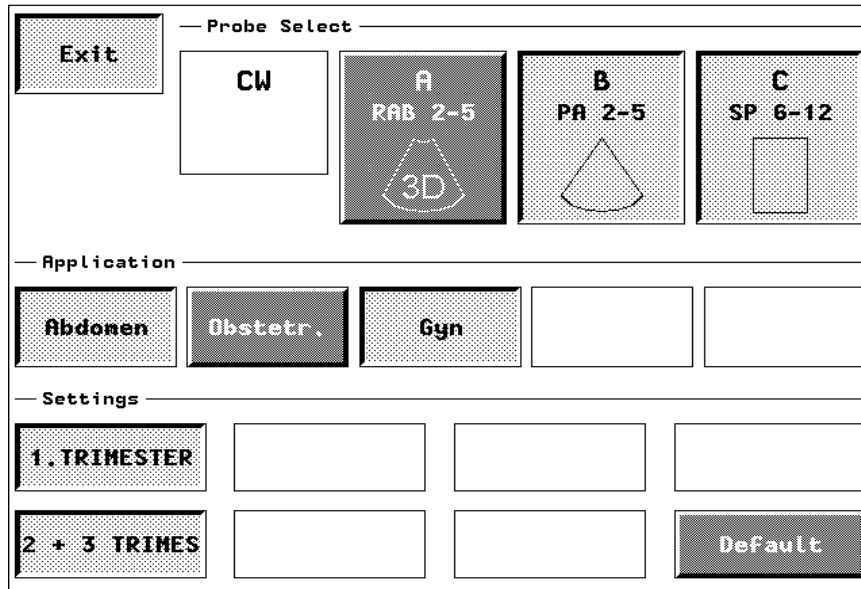
Probe / Program Selection *chapter 4.5*



activates and deactivates the „probe select“ menu



Touching a setting key causes loading of the preset. The probe is started. (Write-Mode)

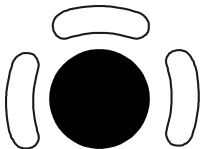


Probe window:
shows all connected probes

Application window:
shows all applications for the active probe

Setting (program) window:
shows all settings for the active application

Functions of the Trackball



trackball: positions cursors, Cine-loop, position and size of the box (e.g.: C-ROI) etc.

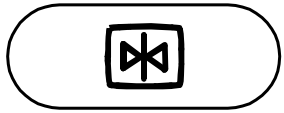
upper trackball key: changes the actual trackball function

left/right trackball key: sets, fixates cursors and activates pages/buttons (e.g.: Start, Vol_pre, Exit, etc.)

The status bar shows the current trackball functionality.



To freeze an Image



Freeze/Run resp. Read/Write-key

Entering Patient Data



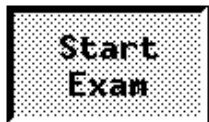
Input of Patient Data with the keyboard

3 possibilities to select an input field:

1. with the trackball and the trackball keys
2. with the keys on the touchpanel
3. with the keyboard keys [Enter] and [Tab]

Additional input fields for 4 different applications:

1. General = default
2. OB
3. GYN
4. Cardio



Start Exam

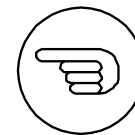
Image Annotation



two possibilities to write text on the screen:

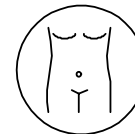
1. input with the keyboard keys
2. annotation with predefined words for different applications (Auto Text)

Indicator



Position the indicator using the trackball.
Direction (360° rotation) with the digipot.
Fixation with the trackball keys.

Pictogram (Bodymarks)

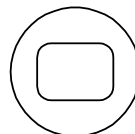


The touchpanel shows previous used bodymark.
Fixation with the right resp. left trackball key.
Adjust the scan plan line with the "Angle" knob.



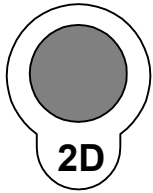
changes between the different application-related bodymarks

Graphic clear



clear graphics and annotations on the screen

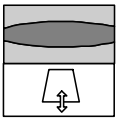
2D-Mode *chapter 5*



Press: changes from another Mode to 2D-Mode and to Single display!

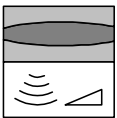
Turn: gain control (**2D-Gain**)

Depth



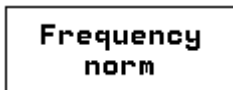
“Depth” -flip control:
stepwise reduction resp.
extension of the depth range

Transmit Power



“Power” -flip control:
flipping up-/down adjusts
more resp. less transmit power output

Receiver Frequency Range



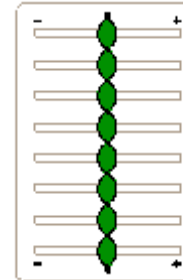
penet: high resolution / lower penetration
norm: mid resolution / mid penetration
resol: lower resolution / high penetration

Harmonic Imaging



Switch on / off the Harmonic Imaging function

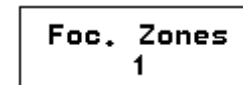
TGC - Slider Controls



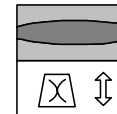
slide to the left:
decreases the gain in the specific depth

slide to the right:
increases the gain in the specific depth

Transmitter Focus

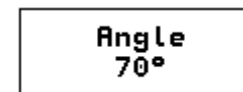


Use the “Foc. Zones” -flip control (below the touchpanel) to select the number of focal zones.



Use the “Focus Depth” -flip control to select the depth position of the actual focus zone(s)

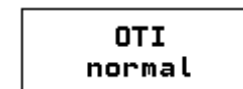
Image Angle



→ increases the image width
← decreases the image width

smaller sector width = higher frame rate

OTI (Optimized Tissue Imaging)



four positions are possible:
adipose, solid, cystic and normal

β-View (Beta View)

adjustment of the O-axis of 3D probes in 2D-Mode



Turn: changes the position of the acoustic block

Press: back to 0° position

FFC (Focus and Frequency Composite)



switch on /off the [FFC] function in 2D-Mode

Trapezoid-Mode



selection of Linear- or Trapezoid-Mode display

CRI (Compound Resolution Imaging)

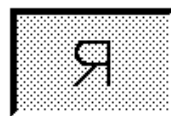


Switch on / off the [CRI] function in 2D-Mode

Remark:

The keys for the functions Focal Zones, OTI, β-View, 2D-Angle, Frequency, FFC, CRI and Trapezoid-Mode only appear on the touchpanel if they are available for the selected probe.

Image Orientation

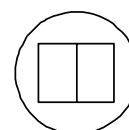
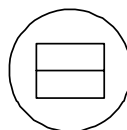


left /right



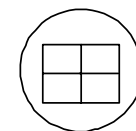
up/down

B-Dual



Press this keys to change from Single or Quad to “B-Dual”.
next position (Dual): 1>2>1 and so on.

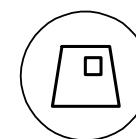
B-Quad



Press this key to change from Single or Dual to “B-Quad”.
next position (Quad): 3>4>1 and so on.

High Resolution Zoom

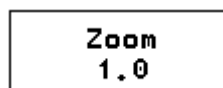
magnification of the 2D-image in Write-Mode:



upper trackball key changes position / size
Press this key again to activate the “HR-Zoom” and to exit the Zoom function.

Pan-Zoom

magnification of the 2D-image in Read- and Write-Mode:

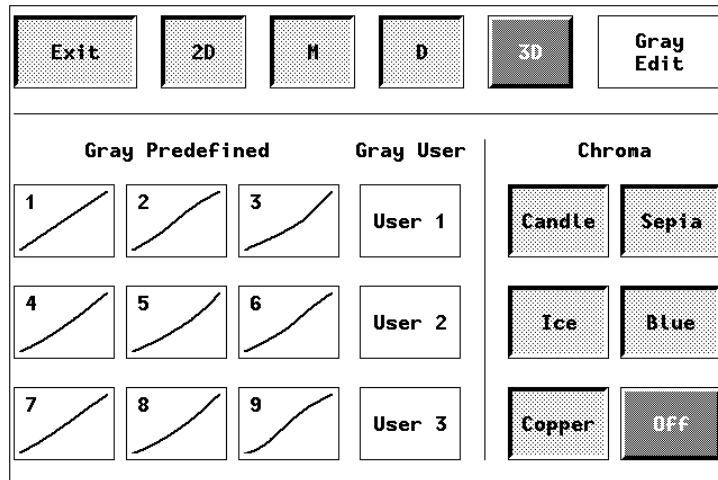


Zoom-digipot: (below the touchpanel)
Press: activates the Factor 1.0

2D-Sub Menu: (Pre-Processing) see [chapter 5.19](#)

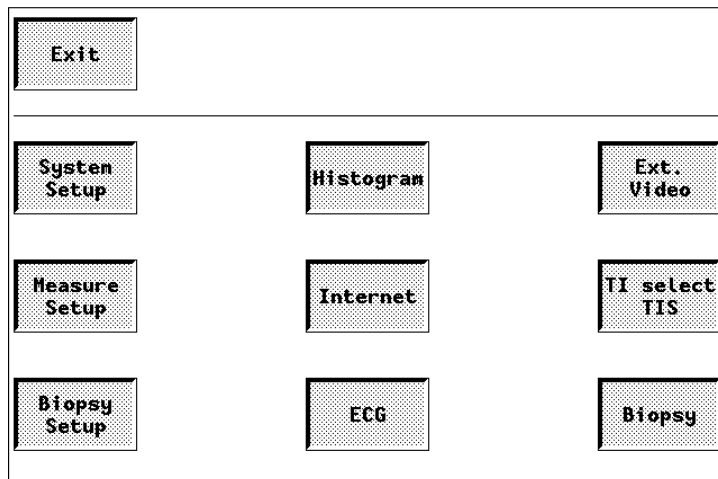
Gray Chroma Map: see [chapter 5.20](#)

“Gray Chroma Map” – key available in **each** Sub-menu



Utilities-Menu: see [chapter 12](#)

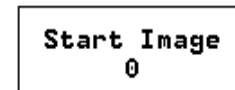
„Utilities“ – key available in **each** Main-menu



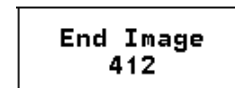
2D Auto Cine



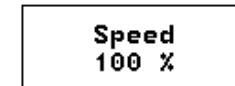
activates the 2D Auto Cine menu



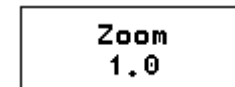
Select the Start Image of the Sequence.



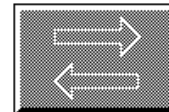
Select the End Image of the Sequence.



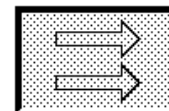
Select the review speed.



Select the read zoom factor.



review of images from Start to End and back

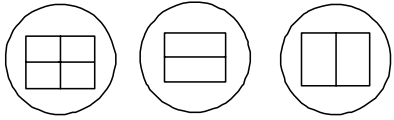


images are only displayed from Start to End



Start/Stop of 2D Auto Cine

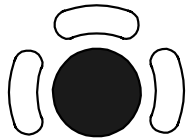
The active 2D-image in Dual- or Quad-Mode is marked with a green dot! (see: [Cine-Split-Function](#))



Cine-Split-Function

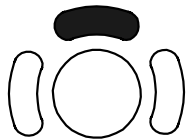
Press the format keys to change to the next (part of) frozen 2D-image sequence.

Cine-Mode



Move the trackball to display the stored 2D-images one by one.

Spectral Doppler- or M-Cineloop



upper trackball key:
changes between the 2D-Cine and the M- or D-Loop

trackball: to recall the stored sequence

The active Cine is displayed on the monitor:

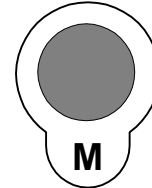
2D/M-Image or **2D/M-Image**

2D/D-Image or **2D/D-Image**

M-Mode [chapter 6](#)



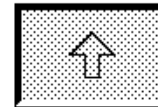
Press: The M-Cursor appears in the active 2D-image.



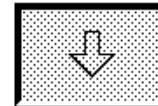
Turn: gain control (**M-Gain**)

The trackball keys activate the M-Mode.

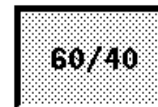
Sweep Speed



four different sweep speeds:
2.0 ; 3.5 ; 6.0 ; 10.0 cm/s



Invert (up/down)
(only possible with endo-vaginal probes)



Format see M-Sub menu
[chapter 6.3](#)

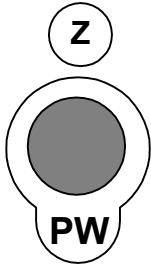
Depth, Frequency and TGC-Slider Controls:
see **2D-Mode**

M-Sub Menu: (Pre-Processing) see [chapter 6.3](#)

Gray Chroma Map: see **2D-Mode** or [chapter 5.20](#)

Spectral Doppler [chapter 7](#)

Pulsed Wave Doppler: [chapter 7.1](#)



Press:

The PW-Cursor appears in the active 2D-image.

Turn:

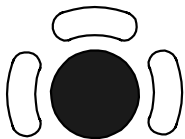
gain control (**PW-/** resp. **CW-Gain**)

Continuous Wave Doppler: [chapter 7.2](#)



Press:

The CW-Cursor appears in the active 2D-image.



trackball: Doppler-Cursor- resp. gate-position

upper key: changes the trackball function

left key: either Doppler- or 2D-image active

right key: Doppler- and 2D-Mode active

Baseline

Baseline

shifting up and down in 8 steps
(possible in Read- and Write-Mode)

Velocity Range

Vel. Range
5.7 KHz

higher Vel. range = higher PRF
maximum is exceed: HPRF is switched on

Angle Correction

Angle
70°

adjustment in Write- and Read-Mode

Press: the angle correction switches
from + 60° to 0° and to – 60°

CW-Doppler: The angle correction line is at the same
time the depth marker for the focus.

Wall-Motion Filter

WMF
High1

Settings: low1, low.2, mid1, mid2,
high1, high2 and max.

Real-Time Trace



Display: envelope curve simultaneously
with the Doppler spectrum

Switch on / off the Real-Time Trace

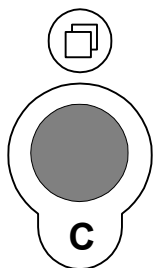
Sweep Speed, Invert, Format and Cineloop:
see **M-Mode**

PW-Sub Menu: (Pre-Processing) see [chapter 7.1.3](#)

CW-Sub Menu: (Pre-Processing) see [chapter 7.2.3](#)

Gray Chroma Map: see **2D-Mode** or [chapter 5.20](#)

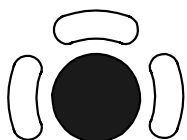
CFM-Mode (Color Doppler) [chapter 8](#)



Press:

The C-box appears in the active 2D-image.

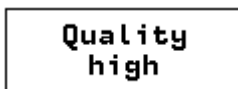
Turn: gain control (**C-/ resp. TD-Gain**)



trackball: adjustment of C-box position

upper key: changes trackball function
box-position resp. box-size

Quality



high: higher color resolution/
lower frame rate

norm: normal color resolution/medium frame rate

low: lower color resolution/higher frame rate

Steering



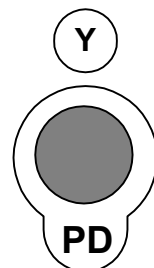
Beam Steering:
only possible with
linear probes

Wall-Motion Filter, Invert and Velocity Range:
see [Spectral Doppler](#)

CFM-Sub Menu: (Pre-Processing) see [chapter 8.3](#)

Gray Chroma Map: see [2D-Mode](#) or [chapter 5.20](#)

PD-Mode (Power Doppler) [chapter 9](#)



Press:

PD-box appears in the active 2D-image

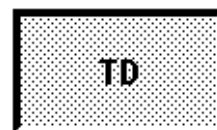
Turn: gain control (**PD-Gain**)

Trackball functions, Quality and Steering: see [CFM-Mode](#)
WMF and Velocity Range: see [Spectral Doppler](#)

PD-Sub Menu: (Pre-Processing) see [chapter 9.3](#)

Gray-/Chroma Map: see [2D-Mode](#) or [chapter 5.20](#)

TD-Mode (Tissue Doppler) [chapter 10](#)



Touching:

TD-box appears in the active 2D-image

Remark:


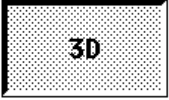
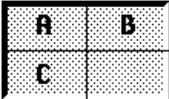
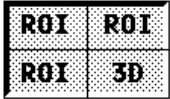
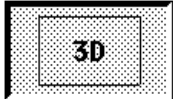
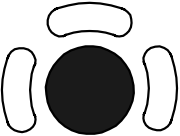
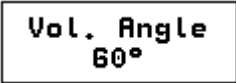
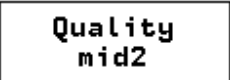

- [TD] key only visible if selected probe is capable for TD-Mode
- “C-Mode” key adjusts the TD-Gain

Trackball functions, Quality and Steering: see [CFM-Mode](#)
WMF, Invert and Velocity Range: see [Spectral Doppler](#)

TD-Sub Menu: (Pre-Processing) see [chapter 10.3](#)

Gray-/Chroma Map: see [2D-Mode](#) or [chapter 5.20](#)

3D Volume-Mode chapter 11.3.1

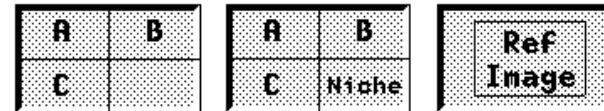
1. Press: The Volume-Mode function is switched on.

2. touch the 3D-key on the touchpanel

3. select the desired display format:



4. trackball: adjusts the volume-box
 PD ROI-box = volume-box
upper key: changes trackball function
 box-position resp. box-size

5. set the volume sweep angle

6. select the quality (acquisition speed)

low: fast speed/low scan density
mid: stand. scan/medium scan density
high2: slow speed/high scan density
7. To start 3D acquisition press the  key or the right trackball key (**Start**).

Remark:

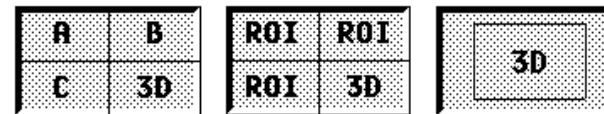
- The obtaining of volumes is also possible with PD-Mode.
- Vol.-preparation: press the right trackball key (**Vol_pre**)

After the 3D-Aquisition

visualization of Sectional Planes

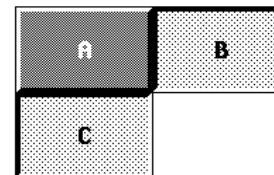


visualization of 3D Image Rendering



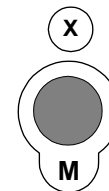
Choosing a Reference Image

Ref. image select

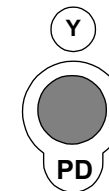


Choosing a reference image automatically determines the control functions of the rotary controls and the trackball for the liberal adjustment of a sectional plane.

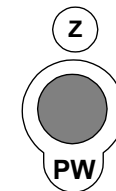
Rotation of the Reference Image



about X-axis

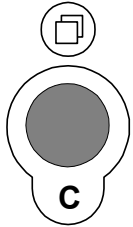


about Y-axis

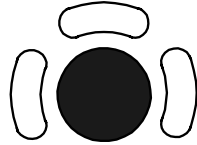


about Z-axis

Translation of the Reference Image



parallel shifting



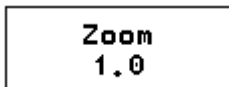
along X- and Y-axis

Initial Condition



resets the rotations and translations of a volume section to the initial (start) position

Magnification (Zoom)



All sectional images A, B and C and the 3D image will be magnified resp. reduced.

3D Rotation Cine



key in the “3D Image Rendering” menu

select between: New Cine Sequence
Start/Stop calculated Sequence






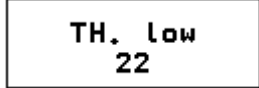

Operation: see [chapter 11.3.1.4.12](#)

Tool Menu from [chapter 11.3.1.4.13](#)



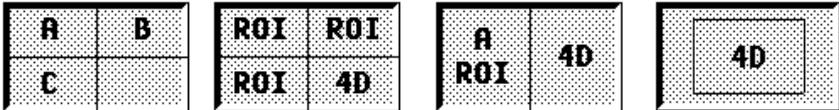
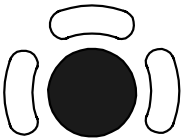



key in the “3D-Image Rendering” menu
The tool menu appears on the touchpanel.

Adjustments in the Tool Menu:

1.  select the desired Render-Direction
(the green line symbolizes the view direction)
2.  select image type and render algorithm:
Surface Modes: (e.g. Surface Smooth)
Transparent Modes: (e.g. X-Ray-Mode)
-  to mix two Render-Modes
3.  Gray Chroma Map:
see [2D-Mode](#) or [chapter 11.3.1.4.13.7](#)
4.  “MagiCut” see: [chapter 11.3.1.4.13.6.1](#)
Use the digipots to rotate the 3D-image.
5.  Threshold controls
TH.high and TH.low (reject) are only possible in Surface Mode
6.  small number = low transparency
higher number = increases transparency

Real Time 4D-Acquisition *chapter 11.3.2*

1. Press: The Volume-Mode function is switched on.

2. touch the 4D-key on the touchpanel

3. select the desired display format:

4. trackball: adjustment of the volume-box
upper key: changes trackball function box-position resp. box-size

5. set the volume sweep angle
6. select Quality (acquisition speed)
low: fast speed/low scan density
mid: standard Vol. scan/medium scan density
high2: slow speed/high scan density
7. To start the 4D acquisition press the  key or the right trackball key (**Start**).

Remarks:

- Vol.-preparation: press the right trackball key (**Vol_pre**)

Initial Condition, Magnification (Zoom) and Adjustments in the Tool Menu: see **3D Volume-Mode**

3D Orientation

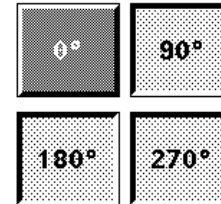
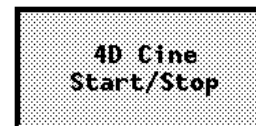


Image Orientation of the 4D-Image

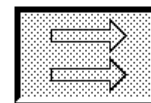
Change the image orientation of the 3D-image and the sectional planes in Read- or Write-Mode.

After the Real Time 4D-Acquisition

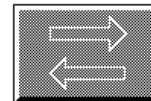
After "Freeze" the 4D Cine menu and the selected display format appears on the screen.



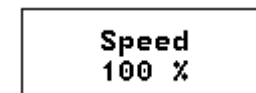
- Start/Stop the 4D Cine
- the last 64 images will be displayed (image by image with the trackball)



replay in one direction



replay in both directions



select the Cine speed
6%, 12%, 25%, 50%, 100%, 200%, 400%

Real Time 4D Biopsy [chapter 11.4](#)

Note: Biopsy lines must be programmed!
To program a biopsy line: [chapter 19.1](#)

A circular button with the text "3D/4D" inside.

1. activate the Volume-Mode

A rectangular button with a textured background and the text "4D Biopsy" inside.

2. touch the 4D Biopsy key
(This key only appears if the biopsy line is programmed.)

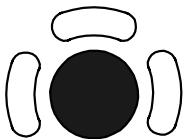
3. select the desired biopsy procedure:

A rectangular button with a textured background and the text "Guided" inside.

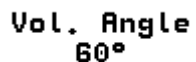
2D-image + biopsy line + volume-box

A rectangular button with a textured background and the text "Freehand 90°" inside.

2D image + volume-box (no biopsy line)



4. trackball: adjusts the volume-box
upper key: changes trackball function
box-position resp. box-size

A rectangular button with a textured background and the text "Vol. Angle 60°" inside.

5. set the volume sweep angle

A rectangular button with a textured background and the text "Quality mid2" inside.

6. select the quality (acquisition speed)

7. Start the 4D Biopsy with the  key or the right trackball key (**Start**).

Vol.-preparation: press right trackball key (**Vol_pre**)

Initial Condition, Magnification (Zoom) and Adjustments in the Tool Menu: see [3D Volume-Mode](#)

A rectangular button with a textured background and the text "Mirror View" inside.

changes the render-view direction
(green line)

After the Real Time 4D Biopsy

The 4D Cine menu appears on the screen.

A rectangular button with a textured background and the text "4D Cine Start/Stop" inside.

Start/Stop 4D Cine

With the trackball the 4D sequence will be displayed image by image.

4D Cine: see [After the Real Time 4D-Acquisition](#)

Real Time 4D Biopsy with Rectal Probe: [chapter 11.4.4](#)

VCI (Volume Contrast Imaging) [chapter 11.5](#)

[VCI] improves the contrast resolution and therefore facilitates finding of diffuse lesions in organs.

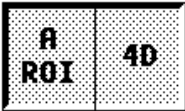

 3D/4D

1. activate the Volume-Mode

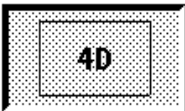

 VCI

2. touch the VCI key

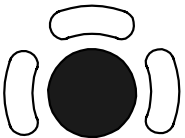
3. select the desired display format:



Real-time 4D Display: A ROI + 4D Image




Real time single 4D Image Rendering

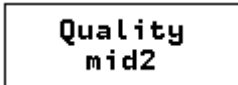


4. trackball: adjusts the volume-box


upper key: changes trackball function
box-position resp. box-size


 Slice Thickn.
5 mm

5. set the Slice Thickness


 Quality
mid2

6. select the quality (acquisition speed)

7. Start the VCI-4D acquisition with the  key or the right trackball key (**Start**).

Vol.-preparation: press right trackball key (**Vol_pre**)

Initial Condition, Magnification (Zoom) and Adjustments in the Tool Menu: see [3D Volume-Mode](#)


 Mirror
View

changes the render-view direction
(green line)

After the Volume Contrast Imaging

The 4D Cine menu appears on the screen.

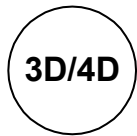

 4D Cine
Start/Stop

Start/Stop 4D Cine

With the trackball the 4D sequence will be displayed image by image.

4D Cine: see [After the Real Time 4D-Acquisition](#)

Live 3D Acquisition [chapter 11.3.3](#)

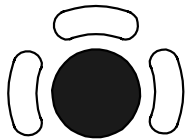
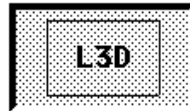
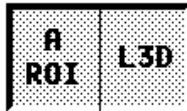
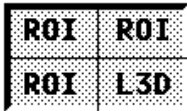
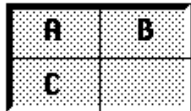


1. activate the Volume-Mode
(Live 3D-probe must be connected and selected!)



2. touch the Live 3D key

3. select the desired display format:



4. trackball: adjusts the Volume-box
upper key: changes trackball function
box-position resp. box-size

5. set the volume sweep angle

6. select the quality (acquisition speed)

7. acquisition start and stop: press the  key.

Initial Condition, Magnification (Zoom) and Adjustments in the Tool Menu: see [3D Volume-Mode](#)

Image Orientation and Cine-Mode:
see [Real Time 4D-Acquisition](#)

Printing (default) [chapter 16.1](#)

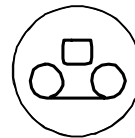


Black/White-Printer



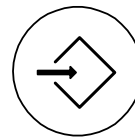
Color-Printer

Recording [chapter 16.2](#)

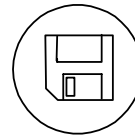


Operation of the video recorder

Saving [chapter 16.3](#)



1. To store 2D-images, 2D-Sequences, 3D-Volumes and 4D-Sequences either in Sonoview, or to send to a DICOM server.
2. Stores AVI-Files on MOD- or CD/RW-Disk.



review of stored images and sequences

Sonoview: see [chapter 15](#)

Report



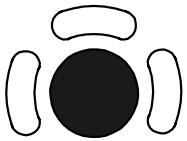
- OB report [chapter 14.2](#)
- GYN report [chapter 14.5](#)
- Cardiac report [chapter 14.7](#)
- Vascular report [chapter 14.10](#)

Basic Measurements [chapter 13](#)

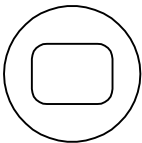


- Distance measurements
- Area measurements
- Volume measurements

Operation:



trackball: positioning of measuring marks
lt./rt. key: sets the measuring marks
upper key: to change measuring marks



erases measurement result

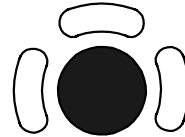
Calculation Measurements [chapter 14](#)



1. OB calculations
2. GYN calculations
3. Cardiac calculations
4. Vascular calculations


Remark: Confirm that the patient information is correct and the probe and corresponding application are selected properly !

Operation:



trackball: positioning of measuring marks
lt./rt. key: sets the measuring marks
upper key: to change measuring marks

Note:

To increase the workflow speed (for details see: [chapter 18.3.1](#)) also the  key can be used to confirm the last measuring mark of the currently performed measurement.

Additional functions:



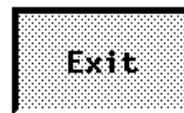
to cancel the measurement of the selected item



to delete the results of the last measured item



to delete all measurements of selected group from the monitor as well as from the report



to exit the Calculation Measurement program

OB Calculations [chapter 14.1](#)

- Fetal Biometry: e.g. AC, BPD, FL, HC, CRL, etc.
- Fetal Cranium: e.g. Cerebellum, OOD, IOD, etc.
- Fetal Long Bones: e.g. Humerus, Ulna, Tibia, etc.
- Fetal Doppler: e.g. Umb. Artery, Fetal Aorta, etc.

AFI (Amniotic Fluid Index), NT (Nuchal Translucency)

Operation: see [Calculation Measurements](#)

The results are included in the OB report.

GYN Calculations [chapter 14.4](#)

- B-Mode: Uterus, Lt./Rt. fetal Kidney, Lt./Rt. Ovary, Lt./Rt. Follicles
- D-Mode: Lt./Rt. Ovarian Artery, Heart Rate

Operation: see [Calculation Measurements](#)

The results are included in the GYN report.

Cardiac Calculations [chapter 14.6](#)

- B-Mode: Simpson, Vol A/L, 2D-Measurements, LV-Mass, LVOT- / RVOT-Diameter
- M-Mode: LV, MV; Ao/LA; HR
- D-Mode: MV, R-R Interval, AoV, TV, PV, LVOT- / RVOT-Doppler, PAP, Pulmonic Veins, HR
- C-Mode: PISA-Radius and PISA-Alias Velocity

Operation: see [Calculation Measurements](#)

The results are included in the Cardiac report.

Vascular Calculations [chapter 14.9](#)

- Lt./Rt. ICA, Lt./Rt. CCA, Lt./Rt. ECA and Peripherals
 - B-Mode: Stenosis (%StA, %StD), Vessel Area, Vessel Distance
 - M-Mode: Heart Rate

Operation: see [Calculation Measurements](#)

The results are included in the Vascular report.

